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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/587,542

07/28/2006

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EXAMINER

LUM, LEON YUN BON

ART UNIT

PAPER NUMBER

1641

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/587,542	<b>Applicant(s)</b> TAN ET AL.	
	<b>Examiner</b> Leon Y. Lum	<b>Art Unit</b> 1641	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 11 June 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 July 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>6/11/07</u> .   | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 5 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claim recites "a second electrode is in contact with said sample." (lines 1-2; emphasis added) By virtue of the term "a" preceding the "second electrode," it appears that Applicants intend for the second electrode to be recited here for the very first time and not to have antecedent basis. Base claim 4, however, recites a "second electrode." (lines 3 and 4) Reading the two claims together, it appears that there are two separate "second electrodes." Claim 5, however, does not indicate a physical relationship between the two "second electrodes" and the specification does not provide any support for two separate "second electrodes." It is, therefore, unclear whether the "second electrode" in claim 5 is the same or different from the "second electrode" in claim 4. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 4, 8-13, 15-19, 21-24 are rejected under 35 U.S.C. 102(b) as being anticipated by Ewart *et al.* (US 5,922,537) ("Ewart").

*i. Independent claims 1 and 15 are anticipated*

Ewart teaches a device comprising three layers: a metallization layer overlaid with a ferroelectric material, which is overlaid with a silica layer. See column 16, lines 62-65. Hence, Ewart teaches "a ferroelectric transducer," as claimed. Moreover, the metal layer can comprise two electrodes, thereby teaching the "first and second electrodes," as claimed. See column 17, line 1 and Figure 8 (illustrating numbers 80 and 82 as being directed to the two electrodes). Ewart also teaches a competition assay, in which an analyte immobilized on the silica layer competes with free analyte for binding to a recognition molecule provided in solution; hence since there is analyte in solution, Ewart teaches "a biological sample disposed adjacent said transducer," as claimed. See column 9, lines 7-8; column 17, lines 3-4; and Figure 8. Ewart further teaches a sensing element attached to the device, thereby teaching "an electric signal detector," as claimed. See column 18, lines 39-54 and Figures 10 and 11.

Ewart also teaches a method of using the aforementioned device, by describing the step of introducing a sample onto the device and detecting an electrical change in the device established through the two electrodes, which in turn necessarily polarizes analyte in the sample described. See column 17, lines 7-18. Indeed, Figure 8 illustrates an electric field between the two electrodes. Moreover, Ewart teaches in one embodiment that the device can be a capacitance sensor and that a change in capacitance is detected. *Id.* Hence, as would be recognized by one skilled in the art, the presence of two capacitor plates next to each other with the application of voltage would necessarily produce an electric field. Consequently, since a change in capacitance is detected, an electric field is necessarily and inherently established. Consequently, Ewart teaches the "establishing" step as claimed.

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*ii. Dependent claims 4, 8-9, 12-13, 16-18, 21 and 23-24 are anticipated*

Regarding claim 4, the claims are directed to an embodiment where, generally, the transducer and sample are in between the two electrodes. The specification does not reasonably limit these elements to a particular arrangement other than currently claimed. With this in mind, Applicants are directed to Figure 8 of Ewart, which illustrates one embodiment of the device comprising a portion of the ferroelectric material and sample in between the two electrodes. See Figure 8 (illustrating number 90 as the ferroelectric material and numbers 80 and 82 as the two electrodes). Moreover, as described *supra*, Ewart inherently teaches the step of establishing an electric field.

Regarding claims 8 and 17, Ewart teaches that the ferroelectric material can be a ferroelectric polymer. See column 15, lines 50-51.

Regarding claims 9 and 18, the ferroelectric layer is a thin film as illustrated in Figure 8 and corresponding citations in the specification.

Regarding claims 10 and 19, Ewart teaches that the analyte can be a protein. See Table 1.

Regarding claims 11 and 22-23, Ewart teaches that, in lieu of a competition immunoassay, a direct immunoassay can be performed with phage particles, i.e., the recognition molecules described above. See column 3, lines 14-18. Since a direct immunoassay involves only the phage particle and analyte, the analyte will necessarily be immobilized directly onto the transducer, as claimed.

Regarding claims 13 and 24, Ewart teaches that, instead of performing a competition assay, a sandwich assay can be performed. See column 3, lines 14-18. Therefore, since the analyte is the object to be detected, the sandwich assay format necessarily requires a probe molecule, as claimed.

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Regarding claim 12, Ewart teaches that the silica layer is optional; hence, the analyte can be bound directly to the ferroelectric layer, as claimed. See column 14, lines 61-63.

Regarding claim 16, since the electrodes have stored charge for performing capacitive detection, a voltage source is necessarily provided.

Regarding claim 21, since the silica layer on the ferroelectric layer is in contact with the sample solution, Ewart teaches the claimed embodiment.

### ***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later

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invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ewart, cited above.

In addition to the aforementioned device, Ewart teaches one embodiment comprising a dual-sided device with the same layers on each side. See column 16, lines 20-37. The purpose of having a dual-sided device is to be able to conduct a reference test. See column 16, lines 38-39.

Regarding claims 2 and 3, Ewart does not teach the step of determining a "difference" between a sample response and a reference response, as claimed. However, it would have been obvious to one of ordinary skill in the art to modify Ewart's teaching to include a step of comparing the sample and reference signals. Indeed, there is but one purpose for performing reference test as described above - to determine a more accurate sample reading, which can only be accomplished by determining a difference between the sample and reference signals.

Regarding claim 3, Ewart evidences analyte detection through changes in electrical signal, as described *supra*. Implicit in this description is the correlation between signal level and

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analyte concentration. Hence, Ewart inherently teaches that the signal is indicative of analyte concentration, as claimed.

7. Claims 1, 4-7 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stasiak *et al.* (US 7,163,659) ("Stasiak") in view of Alexander (US 4,514,441), and in light of Ewart, cited above.

*i. Claims 1, 4-5 and 20 are obvious*

Stasiak teaches a capacitive sensor comprising two electrodes, one with a functional layer thereon and the other in contact with a sample such that the sample is between the two electrodes. See column 6, lines 52-65; column 12, lines 1-22; and Figure 7. Stasiak, therefore, teaches the "placing" step and a "first electrode" and "second electrode," claimed. Stasiak also teaches a method of using the aforementioned device, by describing the step of introducing a sample onto the device and placing a current or voltage through at least one of the electrodes, which necessarily polarizes the analyte; hence, Stasiak teaches the "sensing" step, as claimed. See column 6, line 52 to column 7, line 18; and column 12, lines 40-43. Moreover, as would be recognized by one skilled in the art, the presence of two capacitor plates next to each other with the application of voltage would necessarily produce an electric field. Consequently, since a change in capacitance is detected, an electric field is necessarily and inherently established. Consequently, Stasiak teaches the "establishing" step as claimed.

Stasiak, however, does not teach a ferroelectric transducer.

Alexander teaches that barium titanate is commonly employed as a dielectric material for a variety of electrical applications, including a substrate for sensing films. See column 1, lines 9-20. Barium titanate is well-known to one of ordinary skill in the art as a ferroelectric material, as evidenced by Ewart. See column 16, lines 63-64.



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Given the foregoing teachings, it would have been obvious to one of ordinary skill in the art to modify Stasiak's method by including barium titanate as the dielectric layer, as taught by Alexander. Indeed, given Alexander's description that barium titanate is a well known dielectric, the skilled artisan would have a reason for using barium titanate in Stasiak's device. Moreover, Stasiak generally teaches that any dielectric material can be used and does not preclude a specific material. Accordingly, the skilled artisan would have a reasonable expectation of success in applying Alexander's barium titanate to Stasiak's method.

*ii. Dependent claims 6 and 7 are obvious*

Regarding claims 6 and 7, the claims are obvious for the foregoing reasons and also for the following rationale. Stasiak teaches the step of applying an electrical current to at least one of the electrodes. See column 6, lines 65-66. As would have been apparent to one of ordinary skill in the art, capacitive sensing necessarily involves either applying a current and measuring a change in voltage or applying a voltage and measuring a change in current. Hence, it would have been obvious to perform either method using the sensor of Stasiak.

8. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ewart, cited above, in view of Pankratz (US 4,810,639).

Ewart is described above, but does not teach the step of "removing a remaining portion of said sample," as claimed.

Pankratz teaches a washing step to remove sample constituents and contaminants not bound to the solid phase. See column 8, lines 41-45.

Given the teachings above, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Ewart's method by including a washing step to remove unbound analytes, as taught by Pankratz. The skilled artisan would have been motivated to

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perform the modification based on Pankratz's teaching that the washing step removes contaminants. Indeed, this step would prevent any interference by the contaminants in affecting the assay result. Moreover, Pankratz's washing step is provided in the form of an immunoassay, which is within the scope of Ewart's assay. Accordingly, the skilled artisan would have had a reasonable expectation of success in combining Pankratz's step with Ewart's method.

### ***Conclusion***

9. No claims are allowed.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leon Y. Lum whose telephone number is (571) 272-2872. The examiner can normally be reached on Monday to Friday (8:30 am to 5:00 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark L. Shibuya can be reached on (571) 272-0806. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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/Leon Y. Lum/  
Examiner, Art Unit 1641

/Nelson Yang/  
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